

saw light in the pages of a *Festschrift*, issued by the Technische Hochschule in Carlsruhe, to commemorate the fifty-third birthday of the Grand Duke of Baden. It does, however, contain detailed descriptions of the latest forms of the microscope which have not appeared in print before, and would, moreover, be welcomed for the sake of the interesting historical account of Prof. Lehmann's researches, which spares the student of the subject the difficulty and trouble of hunting up a series of papers published at various dates and in various periodicals.

Nearly forty years have elapsed since Prof. Lehmann, while still a student, first devised a form of microscope by means of which substances could be observed at higher than ordinary room temperature, and the phenomenon of crystallisation watched in actual operation. The results of the research thereby rendered possible were, as is well known, unexpected and startling, and the meaning and even the reality of the observations were for long the subject of considerable discussion and dispute. Other workers have, however, in recent years entered the field, who on the whole have confirmed the accuracy of Prof. Lehmann's observations, and there can be no doubt but that the old ideas regarding crystals and crystallisation needed extensive modification. The investigations are discussed in chronological order in the present book, but since we noticed them less than two years ago (*NATURE*, 1909, vol. lxxix, p. 286), we shall not recur to them here. With each step some improvement in the instrument or some additional facility suggested itself until it reached the most recent form, which is provided with water jackets, powerful heating arrangement, means for reading the temperature, and a camera, and even a kinematograph, for giving a faithful record of the phenomena. The descriptions of the different forms are elucidated by excellent illustrations.

The last chapter of the book might with advantage have been omitted. Discussions of one's claim to priority of discovery, and the proper appraisal of one's work rarely serve a useful purpose, and are to be deprecated.

#### HEAT-ENGINES.

*The Steam-Engine and other Heat-Engines.* By Prof. J. A. Ewing, C.B., F.R.S. Third edition, revised and enlarged. Pp. xvii+604. (Cambridge: University Press, 1910.) Price 15s.

IN this, the third edition, Dr. Ewing has thoroughly revised his well-known text-book, and to some extent he has rewritten certain chapters; for example, the chapter on steam turbines is new, and the greater part of that devoted to gas and oil engines. The most important departure, however, is that in dealing with the properties of steam the author has accepted the characteristic equation of Callendar along with the steam tables derived from it by Mollier. The old steam tables were based chiefly on Regnault's well-known experiments, and it has been recognised that they involve inconsistencies and errors. Prof. Callendar, whose first paper on the subject was published in 1900, has devised a method of treatment

which is free from inconsistencies, and gives, when expressed in the form of tables, results which agree with all the most recent experiments, at any rate, between the temperatures of 0° C. and 200° C. Possibly Callendar's equation will not give such a close approximation to experimental results for pressures lying beyond the upper of these two limits of temperature. In the form of an appendix, Dr. Ewing has added a brief account of Callendar's characteristic equation, and of Mollier's readjustment of the constants. Dr. Ewing has also decided to adopt the Centigrade scale throughout the whole of his book.

In chapter v., which is devoted to entropy, the author describes Dr. Mollier's graphic methods of representing the properties of steam. By the aid of these diagrams the engineer has placed at his disposal a simple method of solving the problem of determining the state of steam which is expanded adiabatically from any initial condition whether superheated or not, and of determining the greatest theoretical output obtainable from steam when the initial condition and the lower limit of temperature are assigned.

Chapter viii., on steam turbines, is an entirely new chapter, and will be found of great assistance by all engineers who are interested in the design and working of the steam turbine. The whole subject of the design of the steam turbine is fully discussed both from the theoretical and from the practical side.

The last chapter is a new one on gas and oil engines. The efficiency of the ideal cycle is worked out on the assumption of constant specific heat, and the author then discusses the problem of the variation of specific heat with temperature, or in other words, the relation between the internal energy of the gas and its temperature, and discusses the effect of this variation upon the efficiency of the ideal engine working on the ordinary gas engine cycle.

In its present form Dr. Ewing's book will undoubtedly be the text-book most frequently consulted by all engineers who have to deal with steam and other forms of heat engines.

T. H. B.

#### GEOLOGICAL NATURE-STUDY.

*The Earth and its Story.* By Dr. A. R. Derryhouse. Pp. 364. (London: C. H. Kelly, n.d.) Price 5s. net.

THIS book has the same title, and covers the same ground, as one issued by Prof. A. Heilprin in 1896. What Heilprin did for young American readers, Dr. Derryhouse does, with even greater lucidity of expression, for beginners and unprofessional naturalists in the British Isles. His book is sent out by the publishers in good clear type, and is illustrated by photographs and maps printed in a brown tint on separate sheets of thick art paper. In this respect it has an advantage over all the elementary geological text-books that we know. Moreover, it is by no means a simple text-book. It is the work of a field-observer, who wishes to bring the results obtained by geologists home to any intelligent reader. Even fossil specimens are photographed, which gives them, for the author's purpose, a desirable air of reality, though the process will find less favour with

the student of generic forms. A coloured geological map of the British Isles is also included.

We have mentioned the illustrations at the outset, since the greater number are the work of the author, and he depends much on them in the physiographic portion of the book. Those of glacial phenomena seem especially excellent. May we, however, mildly protest once more at the translation of *roches moutonnées* as "sheep-back rocks" on p. 103?

The use of parts of British Ordnance maps to illustrate geographical features is in pleasant keeping with what has been done in recent text-books in America. But we venture to question whether a book of this kind should deal with geological history by means of a summary of stratigraphy as known to us in the British Isles. Would it not seem better to widen the view of the beginner by letting him know something of the great features of life-progress on the earth? The unconformities mentioned on p. 218 have no importance, except for the specialist in western Europe; nor are the names Lewisian and Torridonian at all comparable in value with those of the other systems classified in the table, which relate nowadays to no one special country. The real interest of the Carboniferous flora is not conveyed by the statements on p. 269; nor is the development of flowering plants fairly represented on p. 311, in view of discoveries outside our islands.

This introspective point of view, which has been impressed on us for fifty years by university curricula, forces the general reader to meet such things as Coniston Limestone, Blae Wyke Beds, Kimeridge Clay, and Lower London Tertiaries, and leaves him ignorant of the Permo-carboniferous ice-age, and of the immensely interesting development of life-forms and existing land-areas throughout Cainozoic times.

Dr. Dwherryhouse, however, deals excellently with the Pleistocene ice-age, taking here a bold wide survey. As minor criticisms, we do not like the term "Ammonoid" on p. 293, as applied only to forms intermediate between Nautiloids and "the Ammonites." Something seems omitted in the account of the origin of columnar structure on p. 317; the "forces acting at right angles to *ab* and towards 1 and towards 2" are just as "equal and opposite" as those differentiated from them by these terms. The whole point seems to lie in their directions.

It will be seen that this attractive book admirably fulfils its purpose. Any limitations in the last few pages cannot for a moment be ascribed to narrowness of outlook in the author.

G. A. J. C.

#### OUR BOOK SHELF.

*British Weights and Measures.* As Described in the Laws of England from Anglo-Saxon Times. By Col. Sir C. M. Watson, K.C.M.G., C.B. Pp. xii+107. (London: J. Murray, 1910.) Price 2s. 6d. net.

THIS is an account of the history of weights and measures in England from the time of the Anglo-Saxons to the present day. It is meant to be of a popular character, and is written in an attractive manner, but as it includes the results of independent

researches by the author, it may be of some interest to archæologists as well as to the general public. Sir Charles Watson appears to be an opponent of the introduction of the metric system in this country, and his book is in part intended to show that our present system rests on the experience gained by many centuries of legislation, and accordingly should not be abolished hastily in favour of a system of foreign origin and of comparatively recent date.

An interesting account is given of the various "pounds" which have been in use in England. The author is of opinion that the term "troy weight" is derived from an old English word "troi," signifying a balance, and that "avoirdupois" was a generic word used with respect to articles of considerable weight relatively to their value, which were sometimes weighed by a kind of Danish steelyard, or desemer, known as an "auncel." His identification of the gallon of Edward I. with the wine gallon of Queen Anne is not very convincing. He gives a good account of Gunter's chain, which he considers an excellent example of the kind of improvement that can be made with advantage in a system of weights and measures without introducing a new standard of measurement.

On the whole, the author is to be congratulated on having produced an eminently readable book on a subject which is often treated tediously. Some of his suggestions for the simplification of the British system given in the concluding chapter are deserving of consideration, but the proposal to abolish apothecaries' weight would be unlikely to meet with support in the professional circles mainly concerned.

On p. 24, line 8, "three-quarters of a yard" should apparently read "a yard and a half."

*Newcomb-Engelmann's Populäre Astronomie.* Vierte Auflage. In Gemeinschaft mit den Herren Prof. Eberhard, Prof. Ludendorff, Prof. Schwarzschild, herausgegeben von Prof. P. Kempf. Pp. xvi+772. (Leipzig: W. Engelmann, 1911.) Price 14 marks.

PRACTICALLY a generation has passed away since Newcomb's "Popular Astronomy" was first published. Many popular works have appeared since, but they have not supplanted the original work in its entirety, or provided a better model to which continual extensions could be added.

The main intention of the author has been kept in sight in the present edition. He did not cater for the professional investigator or the special student, but he aimed at placing before the general reading public a condensed view of the history, methods, and results of those portions of astronomical research that possessed a popular and philosophic interest. Like the last edition, the present has been entrusted to the staff of the Potsdam Observatory. This is fitting, since it is precisely in the department of astrophysics—the direction to which the energies of the Potsdam astronomers are more specially devoted—that the greatest progress has been made and the greatest need for revision exists. But other astronomers have ably co-operated. Prof. Schwarzschild has rewritten the section on the determination of orbits, and revised the chapter on cosmogony. Seeliger supplies the most recent details on the distribution of stars; Prof. Kobold revises the cometary statistics; Dr. Schweydar writes on the figure of the earth, and discusses recent hypotheses concerning its internal constitution. In this section we should have been glad to see more extended references to the work of Hecker.

Other sections which have been rewritten or extended are those on stellar parallax (Ludendorff), physical constitution of stars (Eberhard), motions of stars